

Appendix H

Fire Behavior Analysis

Fire Behavior Analysis and Report Saddle Crest Community



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Prepared for:

**Orange County Fire Authority
Wildland-Urban Taskforce**

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Prepared By:



Table of Contents

Introduction.....	3
General Geographic Description.....	4
Fire Risk Assessment.....	5
Fire History.....	6
Fire Behavior Analysis (BEHAVE)	8
Fuel Modification Plan	12
Building Construction Material Requirements	30
Additional Fire Protection Features	31
Fire Behavior Analysis and Report Report Summary	32
Appendix A – Fire Modeling Results	33
Appendix B – Chapter 7A	37

SADDLE CREST FIRE BEHAVIOR ANALYSIS AND REPORT

Unincorporated Orange County, CA

Introduction

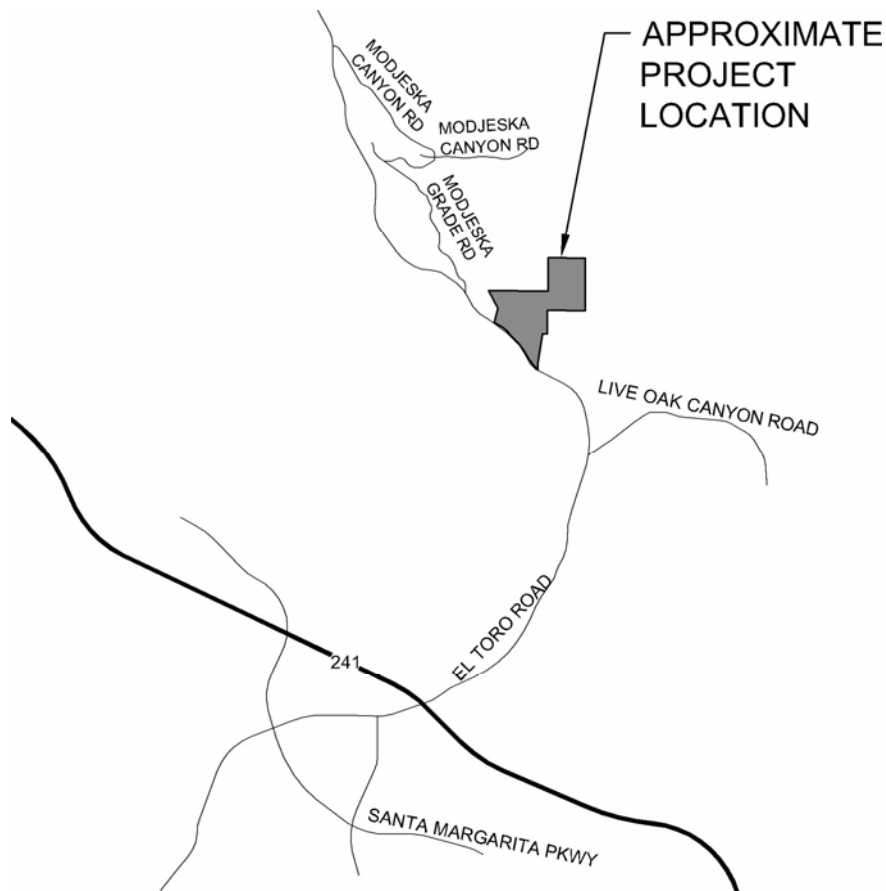
FireSafe Planning Solutions has been contracted to produce a Fire Behavior Analysis and Report for Saddle Crest Planned Community (SCPC) per the request of the Orange County Fire Authority (OCFA). This plan will include the following components:

1. Fire Risk Analysis
2. Compliance with Chapter 7A of the 2007 California Building Code requirements and concepts for enhanced construction features for reduced Fuel Modification Fuel Management Zones
3. Water system requirements
4. Review of systems in place for the establish of maintenance responsibilities and compliance with development approvals for fire protection issues

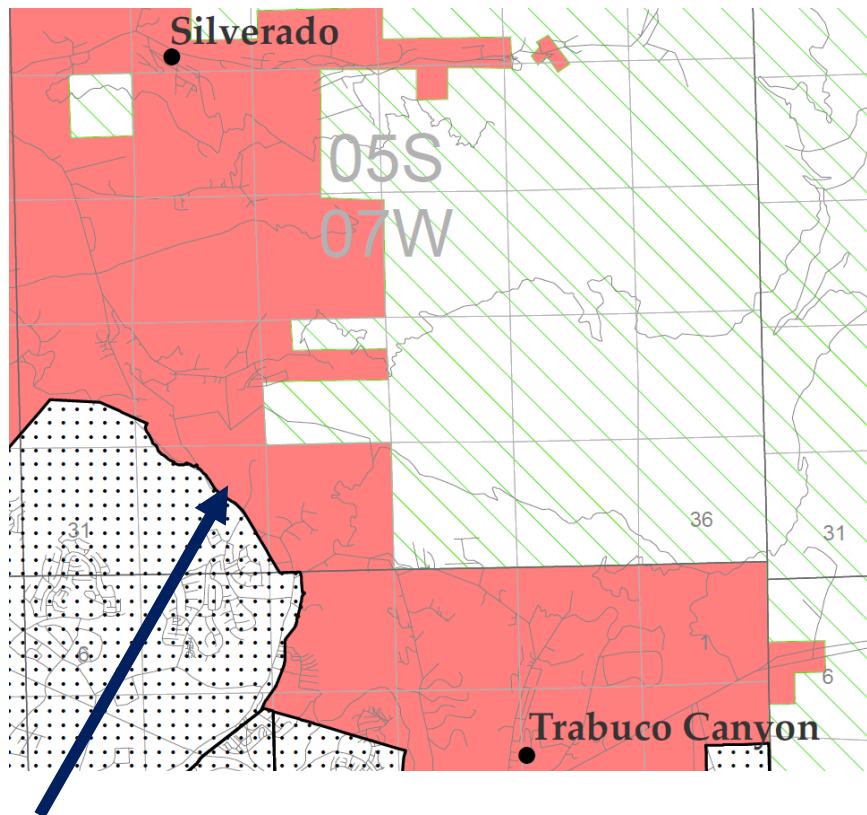
Firesafe Planning Solutions (FPS) analyzed SCPC and its applicability of code requirements. SCPC is a residential development that is under the jurisdiction of OCFA.

General Geographic Description

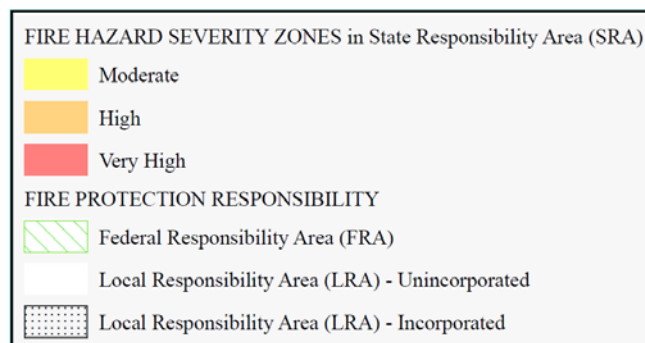
The Saddle Crest project is a planned community in unincorporated Orange County at the foothills of the Santa Ana Mountains. Saddle Crest lies approximately 0.5 miles northwest of Cook's Corner intersection and east of Santiago Canyon Road. To the north of the project is existing open space which leads to Cleveland National Forest. Bordering the project to the northwest and west is an open space conservation easement continuing to privately owned Mills property. To the south the project is adjoined by Santiago Canyon Road as well as the privately owned Carisoza property. Both the Mills and Carisoza properties are for ranching and reduce fuel loads adjacent to barns and residential buildings. Along the east of the Saddle Crest project is County Home Road which serves as access to the privately owned properties which perform brush clearing, further reducing the fuel load surrounding Saddle Crest community. Beyond County Home Road the Santiago Canyon Estates community is found which has maintained Fuel Modification surrounding the community. To the south and southwest of Saddle Crest are Santiago Canyon Road. To the west of Santiago Canyon exist Whiting Ranch Wilderness Park and Portola Hills residential community.



Draft CalFire Fire Hazard Severity Zones Map – Local Responsibility Areas



Project Location



Saddle Crest development area is located within the CalFire State Responsibility Area (SRA) Very High Fire Hazard Severity Zones as shown on the map. This map provided by CalFire is has not been adopted by OCFA. The project is directly north of Local Responsibility Area (LRA) and has Federal Responsibility Area (FRA) abutting the northeast corner of the project.

Fire Risk Assessment

Fire risk assessment is based on several factors. These include the fire history of the development area; the vegetation (fuel) that surrounds the project; the weather history for the general area and the specific sites; the topography of the project site; and the placement of project structures relative to the factors listed above.

The fire behavior analysis in this report was completed to validate fire behavior results (based on a worst case scenario) used to complete the fire protection plan for this development. By using the worst case scenario fire conditions, it is expected that any future fires will be equal to or less extreme than those modeled here and would produce reduced fire behavior spread/intensity and therefore be safer. FPS's approach used to develop the fire hazard assessment and expected wildland fire behavior used in the fuel modification and maintenance plan has been previously approved by OCFA. Computer projections simulate a fire burning within the native vegetative fuels directly outside the boundaries of the Fuel Modification Zones, because the all Fuel Modification Zones have had the undesirable plants removed and are replanted with an approved plant palette that is permanently irrigated or thinned per the maintenance requirements set forth on the Precise Fuel Modification Plan, they will act as a "heat sink" for the fire as it moves into this area. The modeling is completed in all the wildland areas adjacent to the project. After the maximum flame length has been determined, the effects of the thinning zone(s) is applied to calculate the maximum flame length at the juncture of the thinning zone (Zone C and D) and the irrigated zone (Zone B). The Zone B depth is designed to have enough depth to keep direct flame contact in the A zone from the burning native plants. The Zone A is the noncombustible buffer zone that keeps the structures safe. This is a systems approach that utilizes mathematical model of fire behavior to develop a performance based plan to keep the impact of fire, heat and ember from damaging or destroying the properties they are designed to protect. These systems are designed to function without the need for direct fire protection efforts by the fire suppression crews at the time the fire front approaches the structures.

Fire History

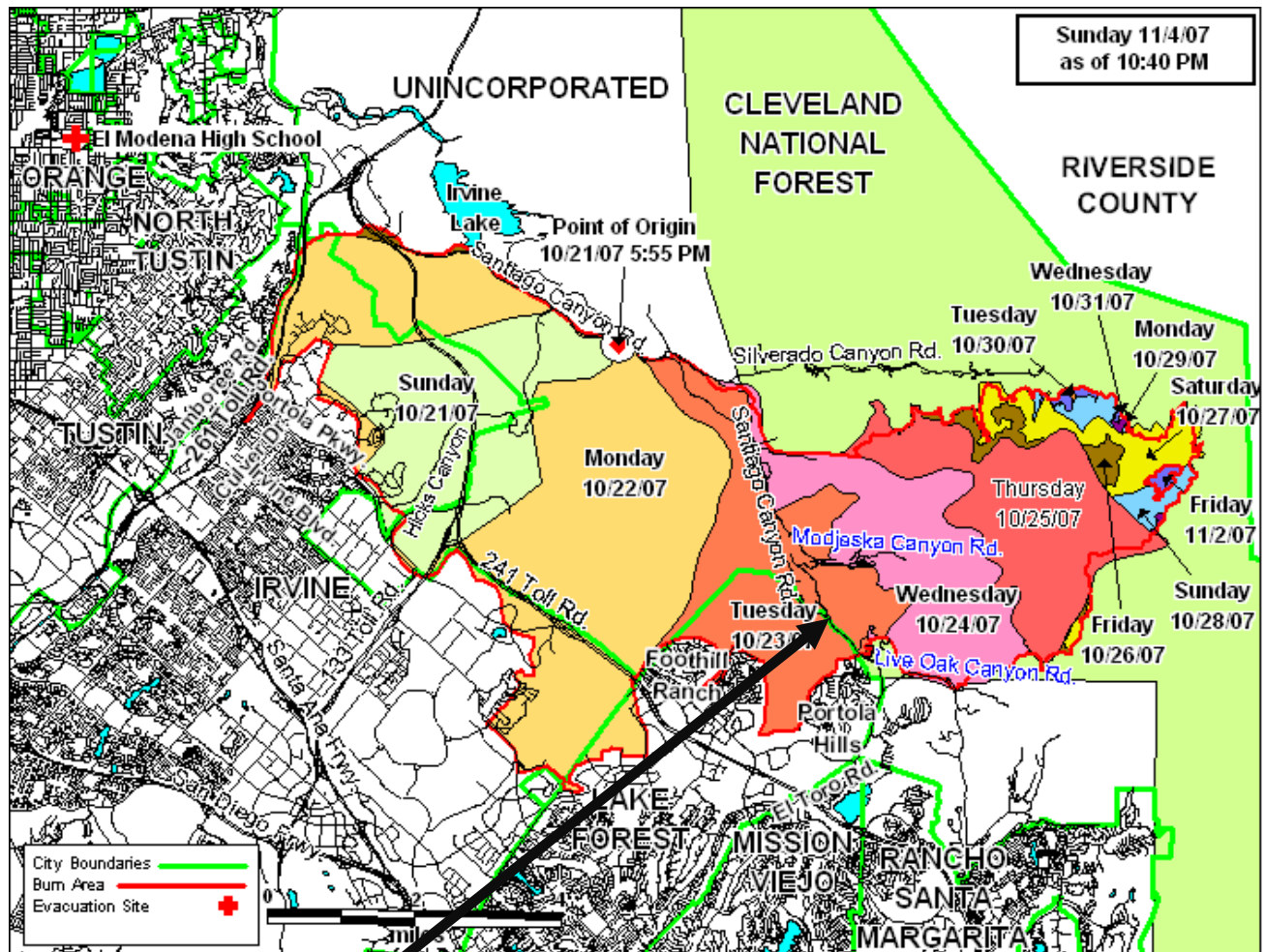
A review of the CalFire database (FRAP) which compiled this statewide spatial database of fire perimeters from BLM, NPS, and USFS fires 10 acres and greater in size and CAL FIRE fires 300 acres and greater in size shows the graphic below. Collection criteria for CAL FIRE fires changed in 2002 to include timber fires greater than 10 acres, brush fires greater than 50 acres, grass fires greater than 300 acres, fires destroying three or more structures, and fires causing \$300,000 or more damage. In 2008 collection criteria for CAL FIRE fires eliminated the monetary criterion and redefined the definition of structures.

Santiago Fire 1997

On September 4, 1997 a fire started along side of Santiago Canyon Road, west of Country Home Road, and burned to the ridgeline above Modjeska Canyon. The fire consumed 338 acres. This fire essentially burned the entire project area. The fire was contained within same operational period with no loss of structures. The fire was contained between Santiago Canyon Road, Country Home Road and the ridgeline between the project area and Modjeska Canyon.

Santiago Fire 2007

The Santiago fire originated at Santiago Canyon Road and Silverado Canyon Road (Thomas Brothers page 832 A2) at 5:55 PM 10/21/07. This fire was a confirmed arson. It was contained on 11/8/2007 at 6:00 a.m. The fire consumed 28,517 acres. This fire resulted in eight residential structures being damaged and fourteen destroyed. An additional three outbuildings were damaged and twenty-four destroyed. Three commercial buildings were damaged and four destroyed. The fire burned the entire project area but did not damage or destroy houses



Approximate Project Site

As shown, the project has had two fires in the past two decades. A historic fire corridor in this area which has produced major fires during NE (Santa Ana) winds but all recorded fires on or near the project site have been during onshore wind conditions (after the end of the Santa Ana wind event in 2007 and with no Santa Ana winds in 1997).

A weather RAWS is not available within the immediate area and for this reason, worst case scenario inputs were used from the historic fire corridor.

Fire Behavior Analysis (BEHAVE)

The BEHAVE, Fire Behavior Prediction and Fuel Modeling System is the most popular and accurate method for predicting wildland fire behavior in prefire defense planning. The BEHAVE fire behavior computer modeling system is utilized by wildland fire experts nationwide. Because the model was designed to predict the spread of a fire, the fire model describes the fire behavior only within the flaming front. The primary driving force in the fire behavior calculations is the dead fuel less than 1/4" in diameter; these are the fine fuels that carry the fire. Fuels larger than 1/4" contribute to fire intensity, but not necessarily to fire spread. The BEHAVE fire model describes a wildfire spreading through surface fuels, which are the burnable materials within 6' of the ground and contiguous to the ground.

This type of modeling demonstrates the best fire defense analysis for Saddle Crest development. The Modeling shows that the measurable fuels are further away than the most extreme flame lengths that would be produced. Using the modeling results, the Precise Fuel Modification Fuel Management Plan was developed to ensure there are no direct interface areas in which a fire in the wildland will have an impact on the future structures.

Worst case National Wildland Coordinating Group Fireline Handbook models have been used for analysis; specifically fuel models 2, 4, gr1, gr2, sh5, sh7, SCAL 15, 16, 17 and 18. Worst case fire weather was used as well.

- One hour dead fuel moistures were calculated at 2%, ten hour at 3% and 100 hour at 5%.
- Live Woody fuels were calculated at 50% in wildland.
- Temperatures were assumed to be in the low 90 degree range.
- Winds are calculated out of the NE at 65 mph (20 foot wind speed) and the SW at 30 mph.
- A wind adjustment factor of .6 was used.
- Fire was modeled running upslope/down slope for the aspect on which the project specific section is situated.

Full details for each model run are available in the appendixes. Version 4.0 of the BEHAVE modeling program was used for this analysis.

Fire Behavior

BEHAVE Calculation inputs for computer fire runs - worst case scenarios:

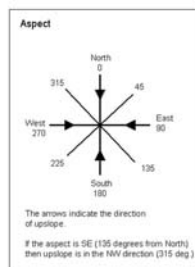
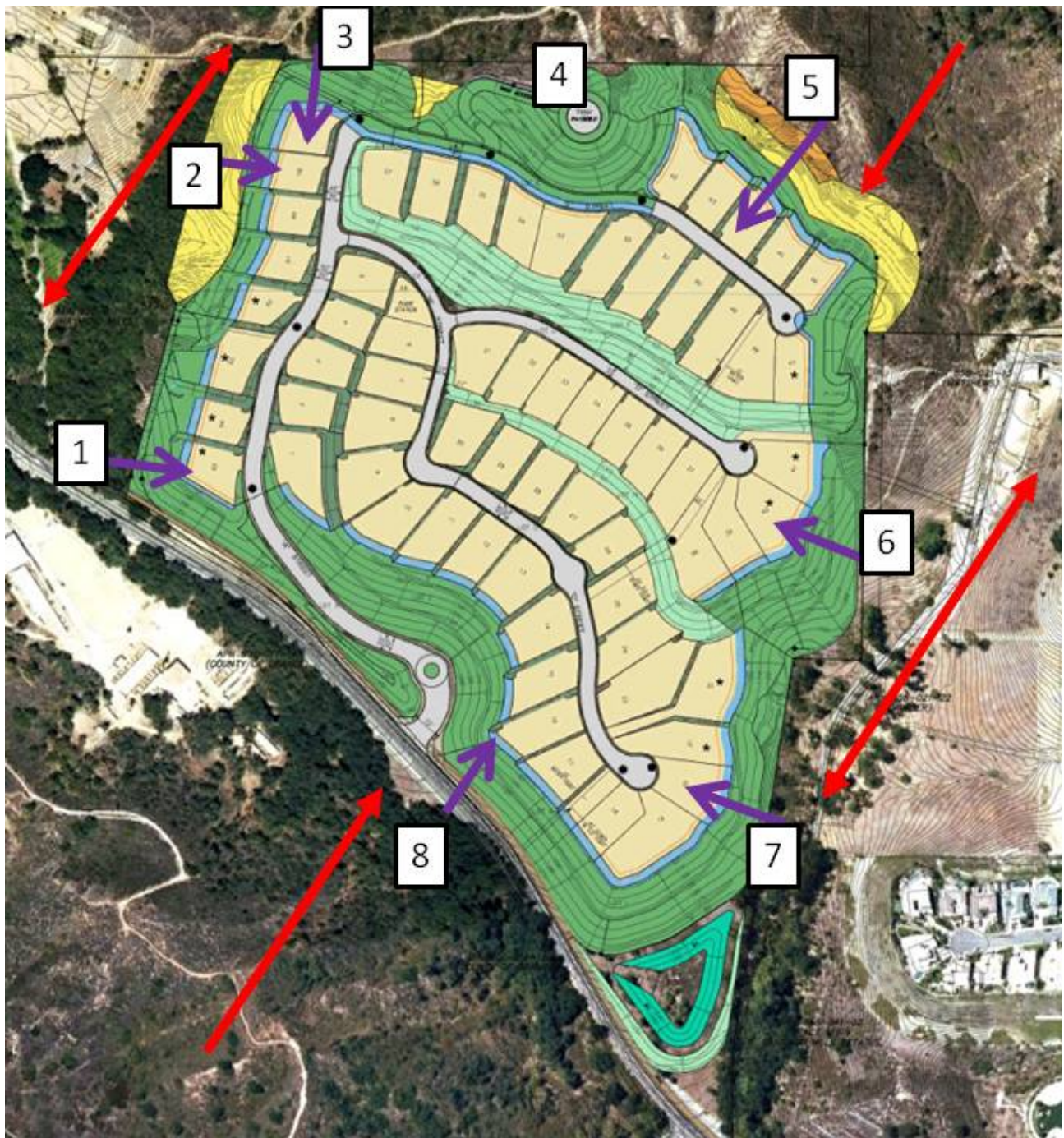
- 65 mph NE offshore wind
- 30 mph SW onshore wind

Eight sections have been used to show the relationship of the wildland to the project. Each demonstrates a different area of the project. Section 4 has not been modeled as it is the water tank location and homes adjacent to this area are protected by the ridge and manufactured slope.

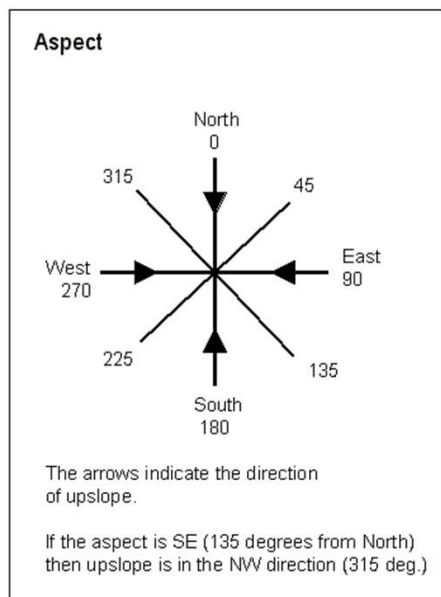
Areas to the west and east of the project are marginally impacted by both the onshore and offshore winds while the north and south areas of the project have direct impacts (northern portion by NE wind and southern portion by the SW wind).

The graphic on the next page shows the locations of the sections/Behave modeling and the basic wind patterns for the area.

SaddleCrest Wind Pattern and Behavior Modeling locations



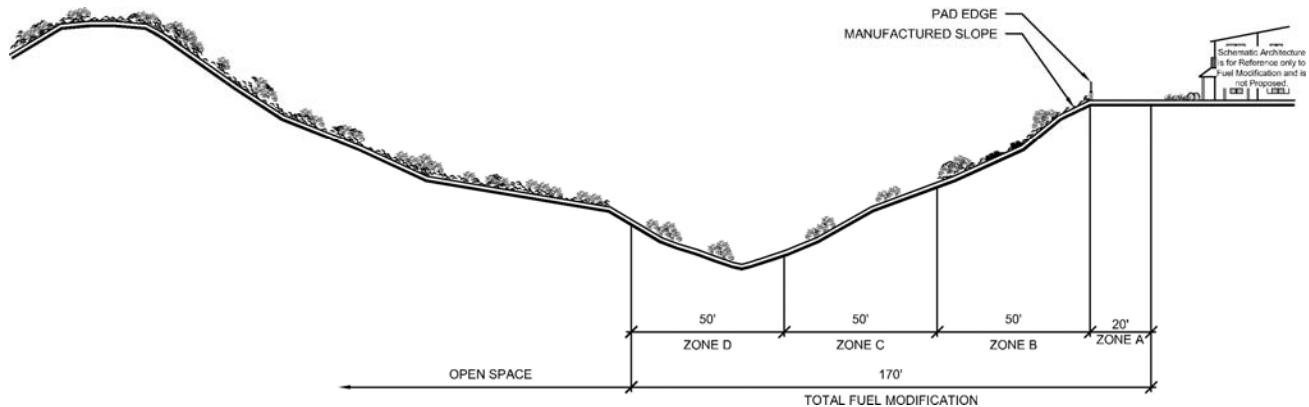
A summary of the modeling results is shown in the table below. The graphic above the table is used to depict the degrees used in the aspect and spread direction outputs from the modeling.



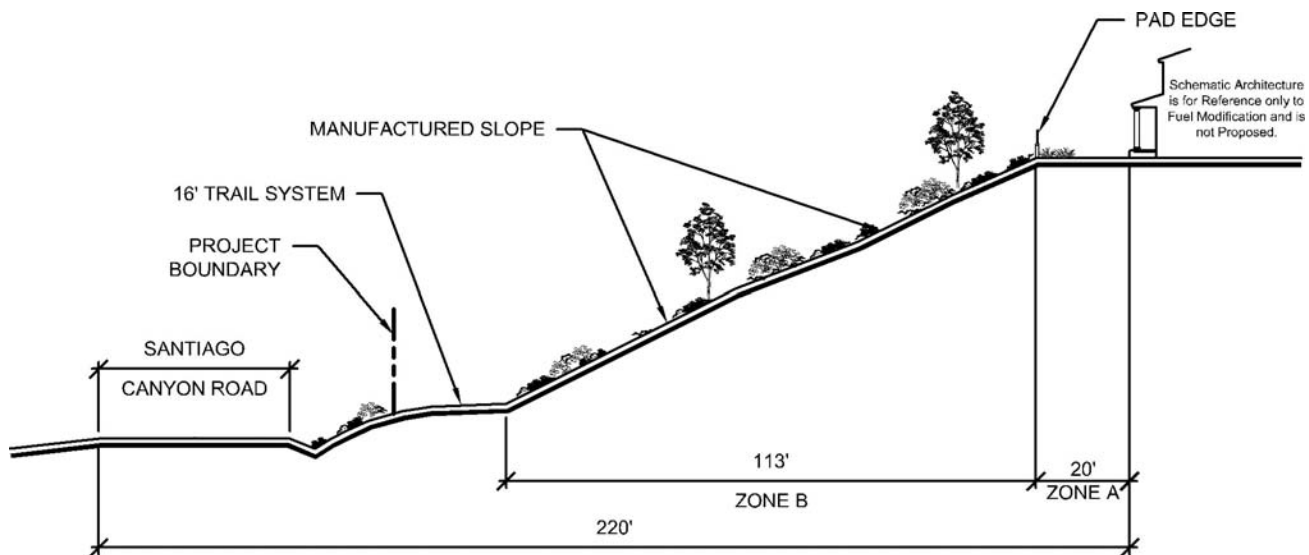
Section	Aspect (degrees)	Slope (percent)	Fuel Model	Spread Direction (degrees)	Scenario	Rate of Spread (feet per minute)	Fireline Intensity (BTU/Ft/Sec)	Flame Length (feet)
1	270	100	2	90	<i>NE wind</i>	7.3	75	3.3
					<i>SW wind</i>	49.3	504	7.9
2	270	100	sh5	90	<i>NE wind</i>	3.8	130	4.2
					<i>SW wind</i>	43.2	1,489	13.0
3	360	100	4	180	<i>NE wind</i>	48.7	2,800	17.3
					<i>SW wind</i>	11.1	637	8.8
4	Water Tank - not modeled							
5	45	100	4	225	<i>NE wind</i>	3,180.2	182,880	118.5
					<i>SW wind</i>	8.7	499	7.8
6	110	50	2	290	<i>NE wind</i>	21.5	220	5.4
					<i>SW wind</i>	8.3	85	3.5
7	110	100	2	290	<i>NE wind</i>	22.4	229	5.5
					<i>SW wind</i>	9.0	92	3.6
8	225	100	4	45	<i>NE wind</i>	6.5	375	6.9

					SW wind	1,237	71,138	76.8
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As the summary table clearly shows that when slope, aspect and wind align, maximum impact from the fire is achieved. This occurs at two locations within the project. In Section 5, the NE wind is in direct alignment with the north facing slope. In this case, the slope is 1:1 or 100%. The resulting fire behavior for the worst case (Model 4 – chaparral) shows a rapid moving flame front of 118 feet at the intersection of the native fuels and the D Zone. The protection system actually modifies all of the fuel on the northern aspect of the slope to achieve the desired level of safety.



The second area of impact is Section 8 where the slope aligns with the SW wind. In this case the flame lengths are somewhat small with a maximum of 77 feet. This area is protected by the roadway (Santiago Canyon Road) and the manufactured slope (planted and irrigated with approved vegetation). The buffer provided here is a minimum of 200 feet.



Protection

Currently Saddle Crest project is required to comply with the 2007 California Building Code Chapter 7A. Since this is the case as a mitigating factor for the deficient Fuel Modification and Fuel Management Zones, and for approval of plant material not currently on the OCFA approved plant list, all structures adjoining a deficient Fuel Modification or Fuel Management shall receive

“enhanced construction” which consist of all 2007 California Building Code Chapter 7A requirements. Chapter 7A amendments require vents to be a minimum of 1/8” and a maximum of 1/4”, however we are providing a maximum of 1/8” venting. All these structure shall also have no venting on the side of the structure facing the Fuel Modification or Fuel Management Zones and shall be protected with NFPA 13-D Automatic Fire Sprinklers.

Fuel Modification Plan

Saddle Crest Fuel Modification Plan consist of four zones different zones. Along the west of the project there are Fuel Modification zones A, B and C. The total distance of the fuel modification zones will be no less than 150 feet. Along the north of the project the Fuel Modification consists mainly A and B Zone with small portions of Zone C. The increased B zone is the result of manufactured slopes leading up to a Water tank which will act as a “heat sink”. At no point will the Fuel Modification Zones be less than 170 feet adjoining the north end of the project. Along the northeast of the project of the Fuel Modification shall include Zones A, B, C and D, totaling a 170’. The fuel modification along the east end of the project will be no less than 122 feet and reach areas of 259 feet. This area will consist of mainly A and B zones on the lot pads and manufactured slopes, respectively, with a C zone only occurring where a manufactured slope does not reach out to the minimum of 120 feet. Along a small portion to the south of the project the Fuel Modification will be 170 feet and consist of Zones A and B. The Fuel modification does not continue along the majority of Santiago Canyon Road to the south and west of the project.

Existing Site Images



Picture A was taken atop a slop from the South of the project facing North to the adjoining Mills and Cleveland National Forest slopes. This image captures the sparse plant material on the slopes.



Picture B was taken from Santiago Canyon Road facing northeast through the Open Space Conservation Easement towards the Southwest portion of the project area. This image clearly shows the existing Oak trees with the grass understory.



Picture C was taken a cul-de-sac access through the adjoining Santiago Canyon Estates Community facing northwest into the east side of the project and capturing the slopes on the western side of Santiago Canyon Road.



Picture D was taken on the southwest corner just north of Country Home Road along Santiago Canyon Road of the project facing north through the project capturing the existing vegetation between Saddle Crest and the Private Property Owners along Country Home Road.



Picture E was taken along Santiago Canyon as depicted in the image above facing northeast into the project area.



Picture F was taken along Santiago Canyon as depicted in the image above facing northeast into the project area.





Picture G was taken along Santiago Canyon as depicted in the image above facing east into the project area.





Picture H was taken along Santiago Canyon as depicted in the image above facing east into the project area.

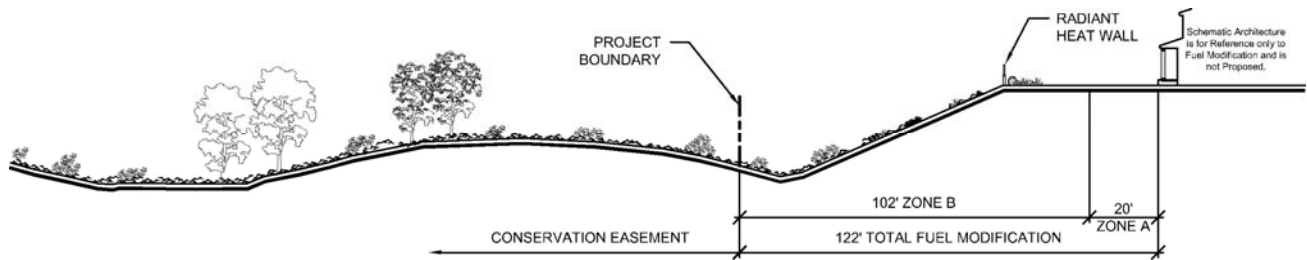




Picture was taken along Santiago Canyon as depicted in the image above facing southeast into the project area..

Fuel Modification Fuel Management Sections

Section 1:



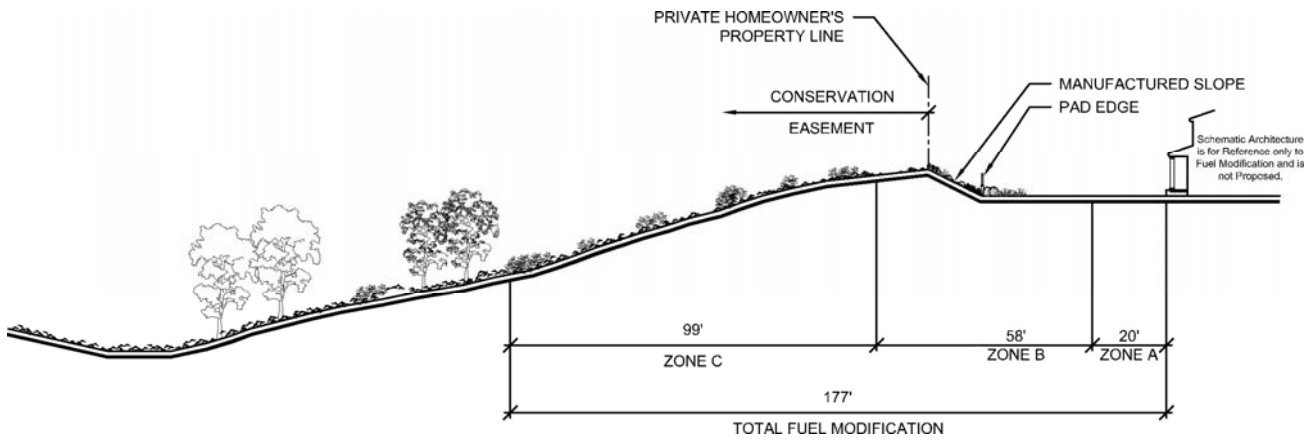
Slope is 100 percent maximum

Aspect 270

Fuel Model 2

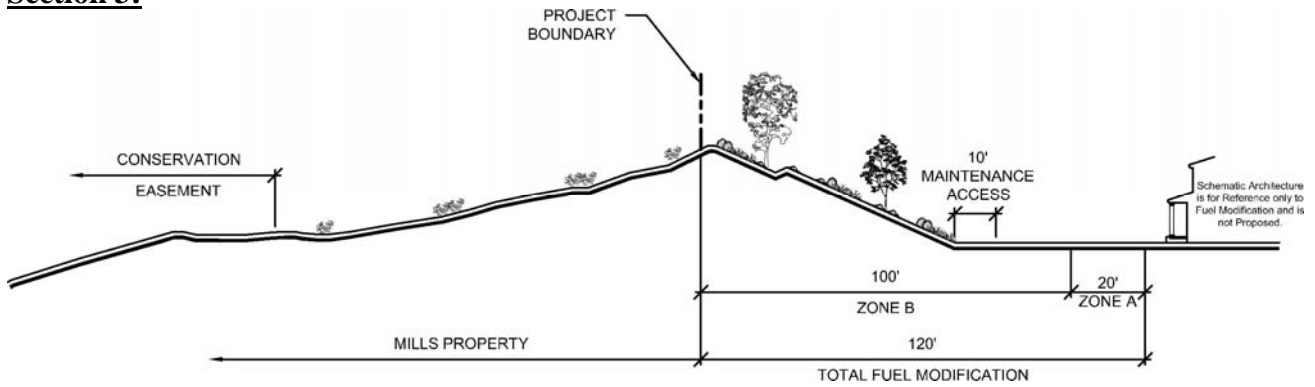


Section 2:



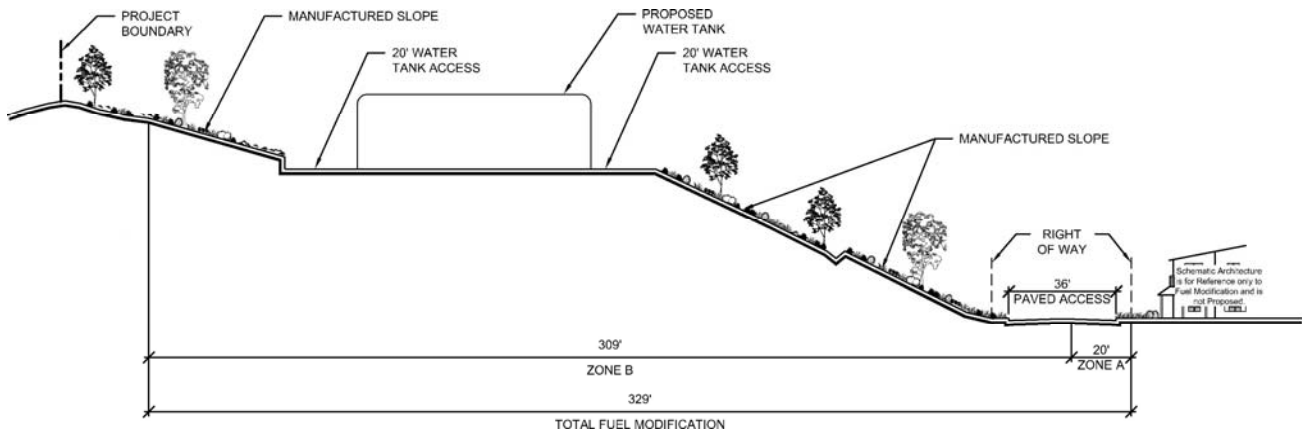
Slope is 100 percent maximum
Aspect 270
Fuel Model sh5

Section 3:



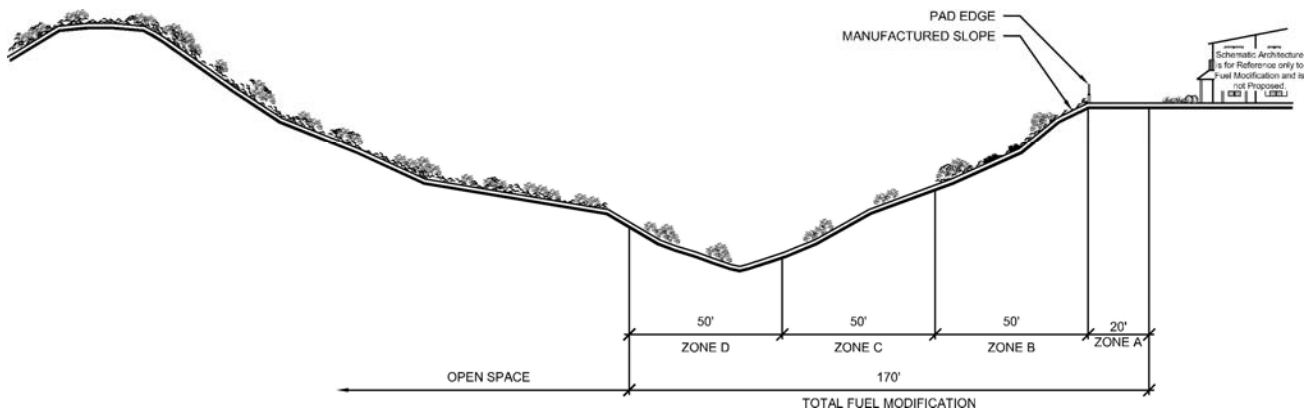
Slope is 100 percent maximum
Aspect is 0
Fuel Model 4

Section 4:



Not Modeled

Section 5:



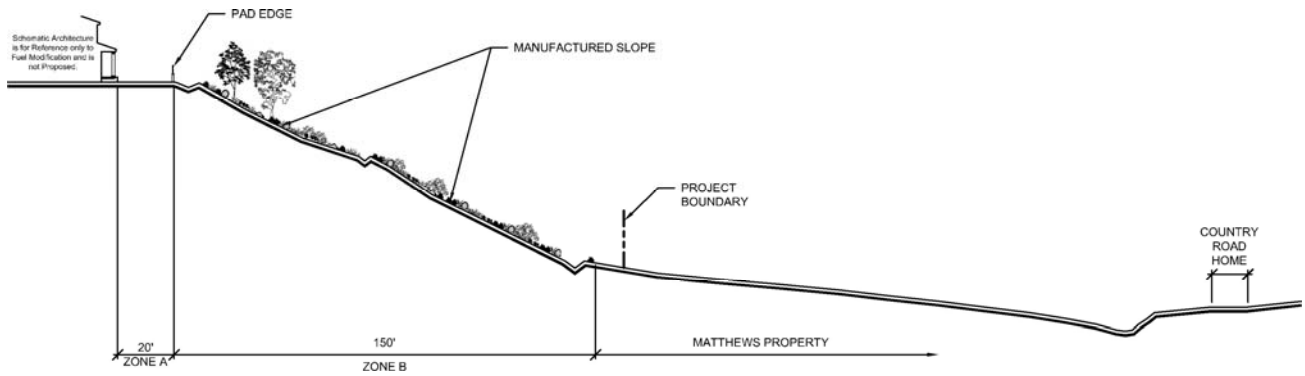
Slope is 100 percent maximum

Aspect is 45

Fuel Model 4



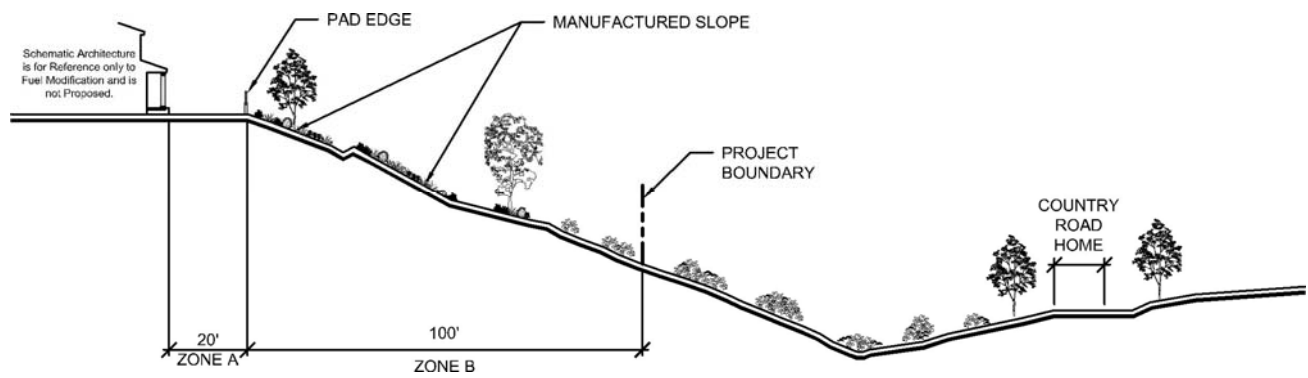
Section 6:



Slope is 50 percent maximum
Aspect is 100
Fuel Model 2

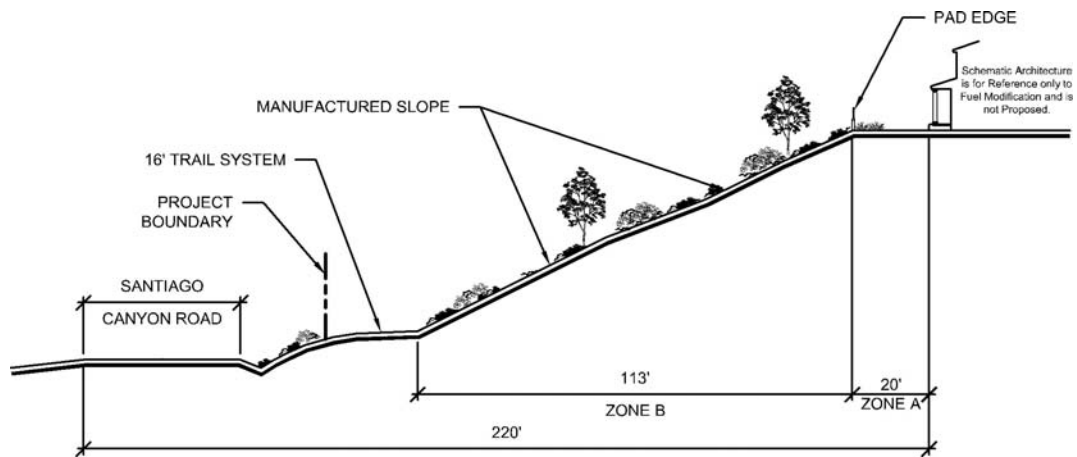


Section 7:



Slope is 100 percent maximum
Aspect is 100
Fuel Model 2

Section 8:



Slope is 100 percent maximum
Aspect is 225
Fuel Model 4



Building Construction Material Requirements

The entire project will have “enhanced construction” protection feature on all four sides of any residential structure. These structures shall comply with the current requirements of the 2007 California Building Code Chapter 7A. This includes eave protection, dual pane windows, fire resistive venting, gutter screens, underside protection of decks and balconies, use of noncombustible building materials or heavy timber construction and other methods to stop ember intrusion and ignition when impacted by the heat and products of combustion from a wildland fire. Chapter 7A amendments require vents to be a minimum of 1/8” and a maximum of 1/4”, however we are providing a maximum of 1/8” venting. All structure adjoining the Fuel Modification shall also have no venting on the side of the structure facing the Fuel Modification Zones. A copy of the Chapter 7A is included in Appendix B of this report.

Additional Fire Protection Features

Built-in Fire Protection

The entire project will be constructed with NFPA 13-D Automatic Fire Sprinklers in all dwelling units. Structures on lots at cul-de-sacs (Lots: 18-22, 38-41 and 46-48) shall also have Automatic Fire Sprinkler protection in attic and small spaces .

Water Supply

In accordance with the approved Fire Master Plan, the minimum Fire Flow provided for this project is 1,500 GPM at 20 psi for two hours. All fire hydrants are public hydrants and all will meet the public fire hydrant standards and the County of Orange Public Works/Engineering standards. Each fire hydrant will be provided with Blue Dots in accordance with OCFA standards.

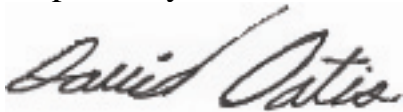
Fire Behavior Analysis and Report Report Summary

The Fuel Modification Plan was designed using the concepts and features described in this Fire Behavior Analysis and Report to provide more than sufficient protection to the community from a wildfire. Certain hardships eliminated the creation of a traditional Fuel Modification Plan, however the mitigating features we have provided more than adequately supplement the deficient Fuel Modification zones. These mitigating features described in this Fire Behavior Analysis and Report include “enhanced construction”, requiring 2007 CBC Chapter 7A for all structures within the community, including a maximum of 1/8” venting and no venting on the side of the structure facing the Fuel Modification zones. Automatic Fire Sprinklers shall be provided for all inhabitable structures within the community..

A review of the current Precise Fuel Modification plan and project design features, have been shown to provide an acceptable level of risk for the proposed development. These plans were validated using fire behavior modeling and structure ignition assessments. It is our opinion that they meet or exceed the latest known fire-resistive standards.

This Fire Behavior Analysis and Report is submitted as one component in a series of fire protection documents designed to insure that the project is constructed in a manner that make it safe for the residents and the city as a whole. We unconditionally recommend approval of this Fire Behavior Analysis and Report to assist in building a safer community.

Respectfully,

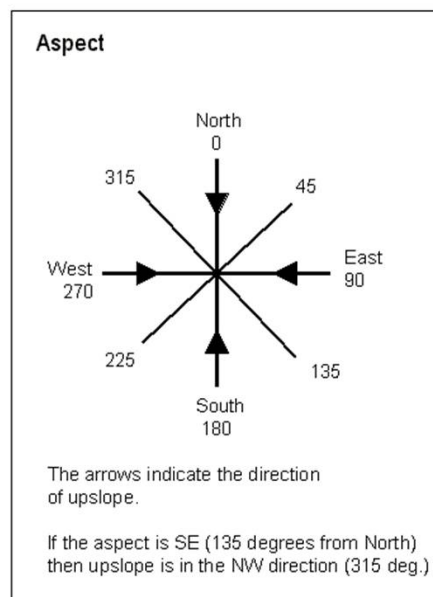
A handwritten signature in dark ink, appearing to read "David Oatis", written in a cursive style.

David Oatis
Firesafe Planning Solutions

Appendix A – Fire Modeling Results

Saddle Crest – Behave Modeling

The project has been modeled for two distinct weather patterns, common to large fire events in Orange County. In this case, the canyon in which the project resides in a North/South canyon alignment. This alignment will produce maximum wind impacts. The project is situated on the side of the canyon (on an east aspect) and will have prevailing winds moving across the project area from the North and from the South. The first modeled scenario is a NE wind (Santa Ana wind event) which is channel by the coastal canyons to create an offshore/down canyon wind. A graphic is provided to show this relationship.



For this modeling, several fuel models were used to show the impacts as vegetation changes with climatic conditions. The following fuel models have been used for each scenario:

Fuel Model

2	Timber grass and understory (S)
gr1	Short, sparse, dry climate grass (D) (101)
gr2	Low load, dry climate grass (D) (102)
4	Chaparral (S)
sh5	High load, dry climate shrub (S) (145)
sh7	Very high load, dry climate shrub (S) (147)
SCAL15	Chamise 1
SCAL17	Chamise 2
SCAL16	North Slope Ceanothus
SCAL18	Sage / Buckwheat

The model inputs (shown below) show that worst case weather/fuel inputs that were used.

- One hour dead fuel moistures were calculated at 2%, ten hour at 3% and 100 hour at 5%.
- Live Woody fuels were calculated at 30% in wildland.
- Temperatures were assumed to be in the low 90 degree range.
- Winds are calculated out of the NE at 65 mph (20 foot wind speed) and the SW at 30 mph.
- A wind adjustment factor of .6 was used.
- Fuels are assumed to be in full direct sun light



BehavePlus 4.0.0

Mon, Oct 26, 2009 at 12:45:34

Page 1

Inputs: SURFACE

Description SaddleCrest NE 65mph 100 percent slope 270 aspect

Fuel/Vegetation, Surface/Understory

Fuel Model 2, gr1, gr2, 4, sh5, sh7, SCAL15,

Fuel Moisture

1-h Moisture	%	<u>2</u>
10-h Moisture	%	<u>3</u>
100-h Moisture	%	<u>5</u>
Live Herbaceous Moisture	%	<u>30</u>
Live Woody Moisture	%	<u>50</u>

Weather

20-ft Wind Speed	mi/h	<u>65.0</u>
Wind Adjustment Factor		<u>0.60</u>
Wind Direction (from north)	deg	<u>45</u>

Terrain

Slope Steepness	%	<u>100</u>
Aspect	deg	<u>270</u>

Fire

Spread Direction (from north)	deg	<u>0, 45, 90, 135, 180, 225, 270, 31</u>
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The model results showed exactly what would be expected from any wind-driven fire. The main body of fire will follow the wind. Slope has some impact but at the wind speeds used, slope has little effect. As shown in the next few tables/graphs, all cases, the model 4 fuel (Chaparral) is the worst case scenarios with flame lengths reaching 119 feet.

The upslope/onshore, SW wind is a unique transitional weather event. The only time that dry air comes up canyon is when a Santa Ana wind event has placed a large amount of dry air over the coastal areas and then breaks down suddenly due to inland heating that reverses the direction of the wind and draws the dry air back onshore before it has time to cool or moisten significantly. This scenario occurs several times per year for short periods of time (hours rather than days). The condition is modeled as it is the worst case scenario for a SW wind event.

The inputs are very similar with one exception, winds are 30 miles per hours.

As shown the rate of spread and fireline intensity overall is diminished but the upslope spread for all fuels have increased. The down slope is relatively constant. This is due to the lower wind speeds allowing for more slope influence.

Appendix B – Chapter 7A

CHAPTER 7A [SFM] MATERIALS AND CONSTRUCTION METHODS FOR EXTERIOR WILDFIRE EXPOSURE

SECTION 701A

SCOPE, PURPOSE AND APPLICATION

701A.1 Scope. *This chapter applies to building materials, systems and/or assemblies used in the exterior design and construction of new buildings located within a Wildland-Urban Interface Fire Area as defined in Section 702A.*

701A.2 Purpose. *The purpose of this chapter is to establish minimum standards for the protection of life and property by increasing the ability of a building located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flames or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses.*

701A.3 Application. *New buildings located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area designated by the enforcing agency for which an application for a building permit is submitted on or after December 1, 2005, shall comply with the following sections:*

1. 704A.1—Roofing

2. 704A.2—Attic Ventilation

701A.3.1 Alternates for materials, design, tests, and methods of construction. *The enforcing agency is permitted to modify the provisions of this chapter for site-specific conditions in accordance with Appendix Chapter 1, Section 104.10. When required by the enforcing agency for the purposes of granting modifications, a fire protection plan shall be submitted in accordance with the California Fire Code, Chapter 47.*

701A.3.2 New buildings located in any fire hazard severity zone. *New buildings located in any Fire Hazard Severity Zone, or any Wildland-Urban Interface Fire Area designated by the enforcing agency for which an application for a building permit is submitted on or after January 1, 2008, shall comply with all sections of this chapter.*

701A.3.2.1 Inspection and certification. *Building permit applications and final completion approvals for buildings within the scope and application of this chapter shall comply with the following:*

701A.3.2.2 *The local building official shall, prior to construction, provide the owner or applicant a certification that the building as proposed to be built complies with all applicable state and local building standards, including those for materials and construction methods for wildfire exposure as described in this chapter.*

701A.3.2.3 *The local building official shall, upon completion of construction, provide the owner or applicant with a copy of the final inspection report that demonstrates the building was constructed in compliance with all applicable state and local building standards, including those for materials and construction methods for wildfire exposure as described in this chapter.*

701A.3.2.4 *Prior to building permit final approval the property shall be in compliance with the vegetation clearance requirements prescribed in California Public Resources Code 4291 California Government Code Section 51182.*

SECTION 702A

DEFINITIONS

For the purposes of this chapter, certain terms are defined below:

CDF DIRECTOR means the Director of the California Department of Forestry and Fire Protection.

FIRE PROTECTION PLAN is a document prepared for a specific project or development proposed for a Wildland Urban Interface Fire Area. It describes ways to minimize and mitigate potential for loss from wildfire exposure. The Fire Protection Plan shall be in accordance with this chapter and the California Fire Code, Chapter 47. When required by the enforcing agency for the purposes of granting modifications, a fire protection plan shall be submitted. Only locally adopted ordinances that have been filed with the California Building Standards Commission or the Department of Housing and Community Development in accordance with Section 101.8 shall apply.

FIRE HAZARD SEVERITY ZONES are geographical areas designated pursuant to California Public Resources Codes Sections 4201 through 4204 and classified as Very High, High, or Moderate in State Responsibility Areas or as Local Agency Very High Fire Hazard Severity Zones designated pursuant to California Government Code, Sections 51175 through 51189. See California Fire Code Article 86. The California Code of Regulations, Title 14, Section 1280, entitles the maps of these geographical areas as "Maps of the Fire Hazard Severity Zones in the State Responsibility Area of California."

IGNITION-RESISTANT MATERIAL is any product which, when tested in accordance with ASTM E 84 for a period of 30 minutes, shall have a flame spread of not over 25 and show no evidence of progressive combustion. In addition, the flame front shall not progress more than 10½ feet (3200 mm) beyond the centerline of the burner at any time during the test. Materials shall pass the accelerated weathering test and be identified as exterior type, in accordance with ASTM D 2898 and ASTM D 3201. All materials shall bear identification showing the fire performance rating thereof. That identification shall be issued by ICC-ES or a testing facility recognized by the State Fire Marshal having a service for inspection of materials at the factory. Fire-Retardant-Treated Wood or noncombustible materials as defined in Section 202 shall satisfy the intent of this section. The enforcing agency may use other definitions of ignition-resistant material that reflect wildfire exposure to building materials and/or their materials, performance in resisting ignition.

LOCAL AGENCY VERY HIGH FIRE HAZARD SEVERITY ZONE means an area designated by a local agency upon the recommendation of the CDF Director pursuant to Government Code Sections 51177(c), 51178 and 5118 that is not a state responsibility area and where a local agency, city, county, city and county, or district is responsible for fire protection.

STATE RESPONSIBILITY AREA means lands that are classified by the Board of Forestry pursuant to Public Resources Code Section 4125 where the financial responsibility of preventing and suppressing forest fires is primarily the responsibility of the state.

WILDFIRE is any uncontrolled fire spreading through vegetative fuels that threatens to destroy life, property, or resources as defined in Public Resources Code Sections 4103 and 4104.

WILDFIRE EXPOSURE is one or a combination of radiant heat, convective heat, direct flame contact and burning embers being projected by vegetation fire to a structure and its immediate environment.

WILDLAND-URBAN INTERFACE FIRE AREA is a geographical area identified by the state as a "Fire Hazard Severity Zone" in accordance with the Public Resources Code Sections 4201 through 4204 and Government Code Sections 51175 through 51189, or other areas designated by the enforcing agency to be at a significant risk from wildfires. See Section 706A for the applicable referenced sections of the Government Code and the Public Resources Code.

SECTION 703A

STANDARDS OF QUALITY

703A.1 General. *Material, systems, and methods of construction used shall be in accordance with this Chapter.*

703A.2 Qualification by testing. *Material and material assemblies tested in accordance with the requirements of Section 703A shall be accepted for use when the results and conditions of those tests are met. Testing shall be performed by a testing agency approved by the State Fire Marshal or identified by an ICC-ES report.*

703A.3 Standards of quality. *The State Fire Marshal standards listed below and as referenced in this chapter are located in the California Referenced Standards Code, Part 12 and Chapter 35 of this code.*

SFM 12-7A-1, Exterior Wall Siding and Sheathing.

SFM 12-7A-2, Exterior Window.

SFM 12-7A-3, Under Eave.

SFM 12-7A-4, Decking.

SECTION 704A

MATERIALS, SYSTEMS AND METHODS OF CONSTRUCTION

704A.1 Roofing.

704A.1.1 General. *Roofs shall comply with the requirements of Chapter 7A and Chapter 15. Roofs shall have a roofing assembly installed in accordance with its listing and the manufacturer's installation instructions.*

704A.1.2 Roof coverings. *Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to prevent the intrusion of flames and embers, be firestopped with approved materials or have one layer of No. 72 ASTM cap sheet installed over the combustible decking.*

704A.1.3 Roof valleys. *When provided, valley flashings shall be not less than 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36-inch-wide (914 mm) underlayment consisting of one layer of No. 72 ASTM cap sheet running the full length of the valley.*

704A.1.4 Reserved.

704A.1.5 Roof gutters. *Roof gutters shall be provided with the means to prevent the accumulation of leaves and debris in the gutter.*

704A.2 Attic ventilation.

704A.2.1 General. *When required by Chapter 15, roof and attic vents shall resist the intrusion of flame and embers into the attic area of the structure, or shall be protected by corrosion-resistant, noncombustible wire mesh with 1/4-inch (6 mm) openings or its equivalent.*

704A.2.2 Eave or cornice vents. *Vents shall not be installed in eaves and cornices.*

Exception: *Eave and cornice vents may be used provided they resist the intrusion of flame and burning embers into the attic area of the structure.*

704A.2.3 Eave protection. *Eaves and soffits shall meet the requirements of SFM 12-7A-3 or shall be protected by ignition-resistant materials or noncombustible construction on the exposed underside.*

704A.3 Exterior walls.

704A.3.1 General. Exterior walls shall be approved noncombustible or ignition-resistant material, heavy timber, or log wall construction or shall provide protection from the intrusion of flames and embers in accordance with standard SFM 12-7A-1.

704A.3.1.1 Exterior wall coverings. Exterior wall coverings shall extend from the top of the foundation to the roof, and terminate at 2-inch (50.8 mm) nominal solid wood blocking between rafters at all roof overhangs, or in the case of enclosed eaves, terminate at the enclosure.

704A.3.2 Exterior wall openings. Exterior wall openings shall be in accordance with this section.

704A.3.2.1 Exterior wall vents. Unless otherwise prohibited by other provisions of this code, vent openings in exterior walls shall resist the intrusion of flame and embers into the structure or vents shall be screened with a corrosion-resistant, noncombustible wire mesh with 1/4-inch (6 mm) openings or its equivalent.

704A.3.2.2 Exterior glazing and window walls. Exterior windows, window walls, glazed doors, and glazed openings within exterior doors shall be insulating-glass units with a minimum of one tempered pane, or glass block units, or have a fire-resistance rating of not less than 20 minutes, when tested according to ASTM E 2010, or conform to the performance requirements of SFM 12-7A-2.

704A.3.2.3 Exterior door assemblies. Exterior door assemblies shall conform to the performance requirements of standard SFM 12-7A-1 or shall be of approved noncombustible construction, or solid core wood having stiles and rails not less than 1 3/8 inches thick with interior field panel thickness no less than 1 1/4 inches thick, or shall have a fire-resistance rating of not less than 20 minutes when tested according to ASTM E 2074.

Exception: Noncombustible or exterior fire-retardant treated wood vehicle access doors are not required to comply with this chapter.

704A.4 Decking, floors and underfloor protection.

704A.4.1 Decking.

704A.4.1.1 Decking surfaces. Decking, surfaces, stair treads, risers, and landings of decks, porches, and balconies where any portion of such surface is within 10 feet (3048 mm) of the primary structure shall comply with one of the following methods:

1. Shall be constructed of ignition-resistant materials and pass the performance requirements of SFM 12-7A-4, Parts A and B.
2. Shall be constructed with heavy timber, exterior fire-retardant-treated wood or approved noncombustible materials.
3. Shall pass the performance requirements of SFM 12-7A-4, Part A, 12-7A-4.7.5.1 only with a net peak heat release rate of 25kW/sq-ft for a 40-minute observation period and:
 - a. Decking surface material shall pass the accelerated weathering test and be identified as exterior type, in accordance with ASTM E 84 and;
 - b. The exterior wall covering to which it the deck is attached and within 10 (3048 mm) feet of the deck shall be constructed of approved noncombustible or ignition resistant material.

Exception: Walls are not required to comply with this subsection if the decking surface material conforms to ASTM E-84 Class B flame spread. The use of paints, coatings, stains, or other surface treatments are not an approved method of protection as required in this chapter.

704A.4.2 Underfloor and appendages protection.

704A.4.2.1 Underside of appendages and floor projections. *The underside of cantilevered and overhanging appendages and floor projections shall maintain the ignition-resistant integrity of exterior walls, or the projection shall be enclosed to the grade.*

704A.4.2.2 Unenclosed underfloor protection. *Buildings shall have all underfloor areas enclosed to the grade with exterior walls in accordance with Section 704A.3.*

Exception: *The complete enclosure of under floor areas may be omitted where the underside of all exposed floors, exposed structural columns, beams and supporting walls are protected as required with exterior ignition-resistant material construction or be heavy timber.*

704A.5 Ancillary buildings and structures.

704A.5.1 Ancillary buildings and structures. *When required by the enforcing agency, ancillary buildings and structures and detached accessory structures shall comply with the provisions of this chapter.*